was introduced by means of a fine trocar passed through the Eustachian tube, while exit to the burner, a platinum tip with a minute opening, was afforded by a drillhole through the thin floor of the tympan and the insertion therein of a small rubber tube. In the living subject a tube with a T-shaped outer end was passed into the Eustachian tube, one end of the "T" connecting with the gas supply, and the other, by means of elastic tubing, with the burner.

Under these conditions sounds conveyed to the drumhead through the external canal and the vocalization of the subject of the experiment, even when only a light whispering voice was used, gave much more detailed representation in the flame than that afforded by the König manometric capsule with a rubber membrane.

Experiments were also made in reference to the question of craniotympanic sound transmission, but, although in themselves interesting, they seemed to have failed to negative the idea of the cranial passage of sound waves direct to the internal ear.

A vibrating tuning-fork, the influence of which upon the flame when held opposite the external canal had been noted, was placed with its stem upon the skull and the character of the flame effect compared with that produced when the external ear was firmly closed, the reaction of the flame, in the latter instance, being much increased.

That the term *craniotympanic,* as referred to the participation of the sound-transmitting mechanism of the middle ear in conveyance to the labyrinth of tones transmitted to the cranial bones is justifiable was shown by another experiment, in which, the vibrating tuning-fork having been placed upon the skull at the point previously found to give the greatest flame reaction, quicksilver or melted paraffin was poured into the external canal, effectively damping the movement of the drumhead. Under these circumstances the craniotympanic reaction was entirely wanting, the sensitive flame showing no movement whatever. On removal of the quicksilver or paraffin the flame immediately responded to the tone of the vibrating tuning-fork.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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Measurements of Relative Humidity in Offices and Dwelling-houses in Winter.—An interesting proof of the statement that the air of heated houses in winter surpasses in aridity any climate in the world is given by G. A. LOVELAND (*Engineering News*, December 10, 1903, p. 925), who relates that in consequence of the evident effect of dry air on the furniture in the United States Weather Bureau Office in Lincoln, Nebraska, which is heated by steam radiators, a consecutive record of the relative humidity was made during the following winter. The observations, made by means of the sling psychrometer, were taken usually twice a day, but sometimes four or five times, and occasionally but once. They showed that during the whole winter the air was exceedingly dry. During the coldest month, February, with a mean temperature of 19.2° F. above zero, the average relative humidity of the office air was but 15.3 per cent. The extreme range was from 7 per cent. to 25 per cent., but only once was the relative humidity higher than 20 per cent., and only once did it fall below 10 per cent. In December, with a mean temperature of 22.6° F., the average relative humidity indoors was 18.6 per cent., and in January, which was the warmest month, with a mean outdoor temperature of 26.8° F., the indoor humidity was 21 per cent. The office temperature during the three months averaged slightly below 70° F. The mean relative humidity outdoors was 77.4 per cent. in December, 73.4 per cent. in January, 77.9 per cent. in February, and 76.2 per cent. for the three months, against but 18.3 per cent. indoors. These results led to further experimentation in a double house, the two halves of which were heated by furnaces of the same size, pattern, and make. The water-pan of each furnace had a capacity of twenty quarts. In one house the amount of water evaporated was determined each day at noon and was found to be but two quarts; in the other the pan was left empty for purposes of comparison. It was found that the difference in relative humidity in the two was so very slight (about 1 per cent.) that the value of the water-pan was not established. After seventeen days' observation the amount evaporated daily was increased to five and nine-tenths quarts by placing pans of water in each of the registers of one house. This resulted in increasing the relative humidity of that house 2.4 per cent. over that of the other. Additional pans were then placed in the cold-air box, whereby the amount of water evaporated daily was increased to ten quarts, but even then the difference in humidity was but 2.2 per cent. Taking into account the probable rate of natural ventilation, it was reckoned that it would require from seventy to one hundred and fifty quarts of water, or possibly more, per day to maintain the relative humidity as high as it was outside, the difference between inside and outside temperatures being from 35° to 50° F., as is the case in winter in Nebraska. In the first period of the experiment the outside and inside relative humidities were, respectively, 68.2 per cent. and 36.2 per cent.; in the second they were 73.8 per cent. and 35.8 per cent.; and in the third, 66.8 per cent. and 29.1 per cent. The average outside and inside temperatures during the three periods were 39.4° F. and 72.1° F., 39.3° F. and 70° F., and 33.3° F. and 69.9° F.

(By means of the "humidifier," which presents to the hot air issuing from a register a surface of wicking kept saturated with water, the relative humidity of the air of a room can be maintained at over 50 per cent., according to Dr. H. J. Barnes, of Boston, who brought it to public notice. In a large office building in Boston the air is maintained at about 50 per cent. relative humidity by means of steam injected into the hot air in the stock-room, from which the air is distributed to the various rooms. The amount of water thus vaporized in a ten-hour workday is no less than 675 gallons.—C. H.)

Shellfish and Typhoid Fever.—It is the belief of Dr. J. T. C. Nash (*Journal of State Medicine*, December, 1903, p. 70) that sewage-contaminated shellfish have played a very large if not a leading part in the general incidence of typhoid fever in England. Prior to the advance in sanitary administration, the chief factors in the incidence of the disease were undoubtedly polluted water and infected milk, but to-day these sources have been so attacked that, as compared with fifty years ago, the relative amount of typhoid has diminished considerably. Yet during the past ten years no improvement, but, on the contrary, a tendency to increase, has been observed, in spite of all sanitary effort. No notable instance of epidemic water-borne typhoid has been observed since the Maidstone and Worthing outbreaks, and milk-borne typhoid has been more uncommon; but yet there appears to be an apparently irreducible minimum of typhoid, with an actual slight increase in prevalence. The reason for this is, in his opinion, that sufficient attention has not been given to the consideration of cleanliness of other foods than milk, for otherwise, the mouth being the portal of infection, localities provided with pure water would not have an undue amount of the disease. An infected water-supply causes a widespread epidemic; an infected milk-supply produces the disease among the customers of the particular dairies involved; but when an outbreak occurs where both the water and the milk are above suspicion, there must be some other common source. Polluted soil may be expected to act as a vehicle of infection only by the surface soil becoming pulverized and blown about by the wind, so that it is deposited on articles of food or directly in the open mouth; but surface soil, owing to the action of direct sunlight, dryness, and the ordinary soil bacteria, is not a favorable habitat for the typhoid organism, which, however, finds more favorable conditions in the deeper layers, where there are fewer saprophytes, more moisture, and less light. Yet it must be admitted that aerial infection from polluted surface soil is an occasional factor. On the other hand, contaminated foods are obvious and most probable sources of infection, especially in the case of those which are obtained in polluted water, such as shellfish, water-cress, etc. He believes that a very considerable proportion of cases of typhoid in England is due to sewage-contaminated shellfish, and in substantiation he asserts that out of 105 cases noticed in his district in 1902, he traced some connection with shellfish in at least 82. He cites the fact that at a well-known seaside resort (presumably Brighton) about 30 per cent. of the cases of typhoid that have occurred for some years past have been attributed to this cause, and that at another, where the disease was unduly prevalent in 1898 and 1899 and was attributed to polluted mussels, the stopping of the sale of the mussels the next year was followed by a marked diminution in the number of cases reported. Owing to the bringing about of diminished consumption of shellfish, on the one hand, and of better methods of laying and cooking and of greater care in obtaining supplies from purer layings, on the other, a very decided diminution in the incidence of the disease has occurred in his own district. By careful inquiry, he estimates that rather less than more than 5 per cent. of the population of that district are eaters of shellfish; and working out for typhoid fever the standard ratios during 1902 per thousand persons in each section of the population, he calculates that for the entire population the attack-rate was 3.28 per thousand; for the shellfish-eating section, reckoned as 5 per cent. of the population, it was 51.25; and for the remainder, only 0.75. Among the shellfish vendors and their employés, he calculates the attack-rate at no less than 160 per thousand. Furthermore, the seasonal incidence of typhoid fever in the country generally is at its lowest in May and June, which months are the close season for English and French oysters. During these months, also, cockles and mussels are not in their prime, and hence are less eaten than at other times. In addition to necessary legislation concerning supervision of all shellfish layings and cultivation beds, he recommends for the diminution of the apparently irreducible minimum of typhoid fever the avoidance of all contact with shellfish, except such as are beyond suspicion of sewage pollution, the avoidance of uncooked vegetables which have been subjected to manurial pollution, the early removal to hospital of all cases of the disease, careful and constant attention to effective disposal of sewage and all forms of refuse, and general cleanliness of all food supplies, especially shellfish and watercress.

According to an editorial in the *Journal of the American Medical Association* of January 23, 1904, a careful investigation by the Health Board of Orange, N. J., of a recent increased prevalence of typhoid fever, exonerated the water-supply of the city as the cause thereof, and led to the conclusion that the outbreak was due to the consumption of oysters procured from infected beds.

Concerning Yellow Fever.—DR. L. O. HOWARD (Supplement to *Public Health Reports*, November 13, 1903) observes that, although the actual localities in which the *stegomyia fasciata* has been found are comparatively small in number, both in the United States and in other parts of the world, we have sufficient facts on which to base a sound generalization, both as to probable actual occurrence and as to the regions in which the species will readily establish if once introduced. All the occurrence within the United States, except at Nashville, fall within the limits of what are known as the tropical and lower austral zones, which include practically all the southern United States which border on the Atlantic Ocean and the Gulf of Mexico, with the exception of those portions of Virginia, North Carolina, South Carolina, Georgia, and Alabama which constitute practically the foothills of the Appalachian chain, namely, Western Virginia and North Carolina, the extreme northwestern corner of South Carolina, the northern part of Georgia, and the extreme northeastern corner of Alabama. The lower austral zone includes also the western half of Tennessee, the western corner of Kentucky, the extreme southern tip of Illinois, the southeastern corner of Missouri, all of Arkansas except the northern portion, the southern portion of Indian Territory, Southern Arizona, some of Northern Arizona, and southern strips in Utah, Nevada, and California. In the greater part of this territory and where the climate is not too dry, the *stegomyia fasciata* probably exists; and in all the rest of this territory where the climate is not too dry, it will undoubtedly flourish if once introduced. We may expect to find it everywhere in the moist tropical zone, or, at all events, when introduced at any point within the low, moist tropics, it may be expected to establish itself. It is noted that the geographical distribution of the yellow fever mosquito corresponds rather well with that of the Texas cattle tick.

The French Yellow Fever Commission, composed of Marchoux, Salimbeni, and Simond, which has pursued the study of yellow fever at

Rio de Janeiro for more than a year, reports (*Annales de l'Institut Pasteur*, November, 1903) that all the conclusions of Reed and his associates have been confirmed in every particular. Otherwise, its work has been unproductive. Dr. G. Sanarelli (*Il Policlinico*, November 21, 1903), however, still opposes the idea that stegomyia is a necessary factor in spreading yellow fever, and asserts anew the importance of the part played by *B. icteroides*.

In a communication to Surgeon-General Walter Wyman (*Public Health Reports*, January 15, 1904), under date of December 18, 1903, the members of Working Party No. 2, Dr. M. J. Rosenau, chairman, report that from their studies at Vera Cruz, Mexico, during the summer of 1903, they are unable to corroborate all the findings of Working Party No. 1, having found phases of the organism *myxococcidium stegomyiæ* in normal mosquitoes.

The fact that it has been proved beyond doubt that the female *stegomyia fasciata* serves as an intermediate host and conveys the poison of yellow fever to non-immunes has led the Louisiana State Board of Health to promulgate the following recommendations (*Public Health Reports*, February 5, 1904): 1. The patient shall be put under a bar and the room properly screened, and all mosquitoes destroyed. 2. The house shall at once be closed and fumigated with pyrethrum powder, 4 ounces to 1000 cubic feet. Intoxicated mosquitoes must be swept up and burned. In case house is not occupied, sulphur should be used, 7 pounds to room, etc. Fumigation must be repeated every fourth day for three or four times. Commence all over with every new case of fever. 3. Every house or outhouse shall be so fumigated for a distance of 100 yards in every direction from the infected house. Fumigation repeated every fourth day for three or four times. 4. Great care to be exercised to prevent new mosquitoes from entering the infected room. When they do so, they must be killed and burned. 5. All cisterns in infected area must be screened or coal-oiled. 6. All vessels containing water must be emptied; pools and ditches drained and coal-oiled. 7. All drains, sinks, and privies are to be liberally sprinkled with coal-oil every third day for a period of eighteen days. Repeat after every new case.

PATHOLOGY AND BACTERIOLOGY.

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A Note on Experimental Arterial Atheroma.—Attempts have been made by several investigators to produce atheroma of the aorta in animals by intravenous injections of bacteria or bacterial toxins. In some cases the aorta was previously injured. Crocq has reported nega-